



PATHFINDER

An informal newsletter published for the GPS user community by PM GPS. Information presented is based on published and submitted news items of interest to the general user. Widest dissemination and reproduction is encouraged. Newsworthy items are solicited for inclusion. Editor Mr. Don Mulligan at PM GPS, PM NAV SYS, Ft Monmouth NJ DSN 992-6137 or (732) 532-6137 or email: Donald.Mulligan1@us.army.mil

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AN/PSN-13 DAGR Fielding Continues!

From the New Product Manager



I am pleased to greet you as the new Product Manager for Army GPS! I want to acknowledge the important work of my predecessor, LTC Skip Harborth, and continue the accelerated fielding he began of next-generation military-rated GPS receivers, the hand-held DAGR and embedded GB-GRAM.

I also pledge to maintain support for fielded GPS systems, especially the PLGR.

I lead a motivated Army PM GPS team dedicated to the soldier. My office is now located at Fort Monmouth NJ. Army GPS continues operations from three locations, product engineering and requirement management at the NAVSTAR GPS Joint Program Office (JPO) in Los Angeles, sustainment operations at the Warner Robins Air Logistics Center in Georgia and Army fielding and readiness logistics here at Fort Monmouth.

If you have a question we can get the answer, so don't hesitate to contact me or a member of my staff. Your feedback is essential to the on-going improvement of the GPS product line. See the "How to Contact Us" box on the last page of this issue.

Ray Matthews, LTC, AV
Product Manager, GPS



Soldiers step outside the classroom at a recent New Equipment Training (NET) session to get some 'stick time' with the keypad and display on the Defense Advanced GPS Receiver (DAGR). DAGR NET is a 3-4 day course of instruction, tailored to MOS. Multiple NET teams are supporting DAGR fielding worldwide.

As of the end of July 2005, 5,795 DAGR sets were fielded to combat and combat support organizations for hand-held users and 5,875 DAGR sets were delivered to Army weapons systems for installation to host platforms, mostly to replace AN/PSN-11 PLGR.

Total Package Fielding includes the DAGR, common DAGR accessories and NET instruction for selected personnel. Effective this month, the AN/PSN-13 was superseded by the AN/PSN-13A but the sets are considered fully interchangeable.
See story on page 3.

REMEMBER! PPS is not just GPS, It's SECURE GPS!

PPS stands for Precise Positioning Service, the secure GPS signal that can only be accessed by a military rated GPS receiver with current crypto keys!

GPS Isn't Working in our HMMWV! What's the Fix?

"We have to hold our GPS receiver out the window of our HMMWV to get reception. What can we do?"

First, like any radio receiver, your GPS receiver needs clear Line of Sight (LOS) access to the radio signals broadcast by the satellites! If you hold a GPS receiver in you hand while riding in a vehicle, you may not have a good GPS solution because the integral antenna in the receiver doesn't get a steady LOS to the satellite signals. Waving the receiver out a window or hatch of a moving vehicle will only produce momentary improvement in signal reception. Vehicles with a metal roof will shield the receiver's antenna from signal reception altogether.

Fortunately, it is not difficult to get good LOS in a vehicle. The solution is to use a remote antenna to collect the GPS signals from outside the vehicle.

It also helps that there are usually 24 satellites on line and they are widely dispersed high in the sky so a stable remote antenna has an excellent chance of providing your receiver with enough signals to maintain an accurate GPS solution.

So install that remote antenna! If you are driving a HMMWV, much of the homework has been done for you. Get the PLGR remote antenna and cable (readily available through requisition) and marry them up with the PLGR to HMMWV installation kit from the Tank Automotive—Armaments Command (TACOM). See the part numbers in the box below.

"What about other vehicles?"

Contact your LAR for help to see what TACOM kits are available for other vehicles. You can also contact the Ground Receivers Integration Team (GRIT) at the PM GPS Georgia Field Office (GFO). They maintain a data bank of known PLGR install kit information. You can contact the GFO by email to the website or the POC listed for Georgia Field Office in this newsletter and ask for access to the non-public GRIT website.

If there is no kit for your vehicle, execute a common sense field expedient solution based on the HMMWV kit. Be careful when grounding the PLGR and be sure to route the cable to protect it from pinching. (Contact the GFO folks for vehicle installation tips).

"We just got DAGR. Got a kit for that?"

Not yet. TACOM does not have a release date for the new DAGR-to-HMMWV kit so adapt the PLGR kit or work out a field expedient solution with your maintenance shop. Some good news is that the DAGR mounting bracket has the same footprint and hole pattern as the PLGR mounting bracket so you can use the same mounting holes already drilled in your vehicle for PLGR. Note that the DAGR uses a dual frequency L1/L2 antenna as opposed to the single frequency antenna that comes with PLGR. Be sure to use the DAGR remote antenna and cable if you are rigging for DAGR!

"What about commercial GPS receivers?"

You are on your own to develop a field expedient solution. Official Secretary of Defense policy prohibits the use of commercial GPS receivers in deployed operations so we do not endorse their use or provide installation advice.

Even with a remote antenna, other factors can influence GPS signal reception, see the article about Situational Awareness in this issue.

And finally, don't forget the bad guys can jam or spoof the GPS signal. Your only defense against intentional interference is a receiver with current crypto-keys.

Military GPS = Secure GPS!

POC: William Burnette Jr. DSN 468-1109

<u>Nomenclature/Item</u>	<u>NSN</u>	<u>Part #</u>	<u>Install Kit Number</u>
PLGR External Antenna	5985-01-375-4660	013-1925-030	n/a
PLGR External Antenna cable	6150-01-375-8662	426-0141-050	n/a
DAGR External Antenna	5985-01-502-6692	013-1981-010	n/a
DAGR External Antenna cable	5995-01-504-1762	987-4640-001	n/a
HMMWV Install Kit M1114	2590-01-529-9541	57K4399	12480574
HMMWV Install Kit (all others)*	2590-01-530-9247	57K4400	12480577
* (excludes ambulance M996AO/A1, M997AO/A1/A2 series)			

New DAGR—What's the Story? AN/PSN-13A

"I've heard there is a new version of DAGR".

Yes, effective August 2005, PM GPS began fielding the upgraded DAGR. It is the AN/PSN-13A and it carries a separate NSN. Here's the story.

AN/PSN-13 NSN 5825-01-516-8038

AN/PSN-13A NSN 5825-01-526-4783

About 10,600 original DAGRs were produced before product improvements were incorporated to create the enhanced version. All future DAGR fieldings will deliver the AN/PSN-13A.

"So are they the same?"

The internal hardware differences between the original and enhanced DAGR are not visible to the user. They consist of manufacturing improvements to reduce the number of parts and the use of a new 3.2 version security chip set. These changes should make the new version even more reliable than the original (which already exceeded DAGR performance requirements). None of the hardware changes affect the user and externally, the DAGRs are identical except for the part number and NSN on the data plate.

The difference between the standard and enhanced DAGR is in the software. The new DAGR has greater processor and memory capability. This means it will be able to download digital maps faster than the original version. Future software functions may be added to the enhanced DAGR. There is no plan to replace the original DAGR or to remanufacture it.

Today's user will find the original and enhanced DAGRs are fully interchangeable.

"What about the accessories?"

All DAGR accessories interface with either version of DAGR. Note: See the related article about DAGR accessories that are interoperable with PLGR elsewhere in this issue.

If you have more questions about the enhanced DAGR contact the DAGR Product Manager.

POC: CPT Threat at DSN 833-0595 or email to Edward.Threat@losangeles.af.mil.

Frequently Asked Questions (FAQ) Section comes to PM GPS website

By the end of August, the Army PM GPS website will have a new page. The Frequently Asked Question (FAQ) page is focused on user concerns with the PLGR and DAGR handheld receivers. The FAQ page will be based on feedback from soldiers worldwide.

Below are some of the questions. The answers will be posted to the FAQ page.

QUESTIONS

- How do I tell if my warranty has expired?
- What is the latest version of the TM for CUGR, PLGR, DAGR?
- I sent my PLGR/DAGR in for repair. How long will it take to get a replacement? Who can I call when my replacement is overdue?
- I sent my PLGR/DAGR in for repair. Why didn't I get my original serial numbered receiver back?
- I lost my PLGR/DAGR. What do I need to do in order to get a replacement?
- Is there really a difference between military and commercial GPS receivers?
- What's the latest on installing GPS to vehicles?
- What GPS training materials are available and how do I get them for my unit?
- What is the latest version of software for GPS?
- What accessories are authorized for PLGR/DAGR?
- Why is disposal of military GPS receivers restricted?
- Are there special procedures for repair of GPS receivers in SouthEast Asia?
- Which batteries are best for PLGR or DAGR?

We invite you to submit questions for FAQ!

Send email to the New Jersey office marked "FAQ page".

Share your concerns and help other soldiers who may have the same question.

POC: Don Mulligan at DSN 992-6137

MAN-TECH - Your In-theater POC for GPS Repair Assistance

Support for many of today's Communications and Electronics systems is dominated by contractors. Some time ago, CECOM established Electronic Sustainment Support Centers (ESSC) to provide "one-stop" shopping for CE support. Today, ManTech is the designated in-theater operator supporting the ESSC in South-West Asia for the evacuation and repair of GPS equipment. Contact your in-theater Point of Contact for assistance to determine the status of any military-issued GPS equipment in the repair cycle!

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Good Line Of Sight (LOS) is more than an antenna! Try Situational Awareness

You read the article on PLGR HMMWV installations and if you don't already have one, you plan to install an external GPS antenna to improve LOS for the receiver inside your vehicle.

Good, but there is more to LOS than the antenna: Situational Awareness of how the environment affects satellite signal reception is key to maintaining good LOS.

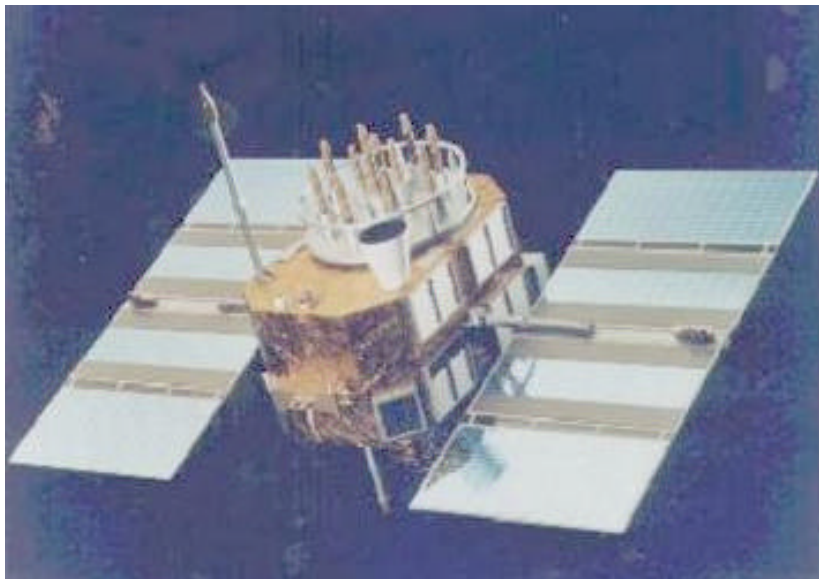
In this regard GPS signals are pretty much like any other radio signal. You have to use common sense when receiving multiple low-power L band signals. Fortunately there are 24 GPS satellites on widely dispersed orbits high in the sky so chances are that you will always have contact with enough of them to maintain a good GPS solution.

How many is enough? The best GPS accuracies are obtained when the receiver is able to collect signals from 3 satellites spaced 120 degrees apart low on the horizon plus a fourth satellite overhead.

If you are operating on the open sea, in the air or on a wide flat desert, you should have great LOS to the GPS satellite signals.

Of course that's not where your mission takes you! The majority of ground operations take place in terrain that is a lot less friendly to LOS. Features such as rolling hills, mountains, dense forests and large buildings in urban areas can disrupt the GPS signal. Even with an external antenna, driving through a deep ravine, dense urban environment, past high power transmitters or power lines or under a dense wet overhead canopy—can result in temporary loss of LOS. (Okay, you don't have much exposure to dense wet overhead canopy on your current deployment but who knows where you'll be in the future).

The good news is that if you are on the move with an external antenna mounted to the roof of your vehicle, a military GPS receiver will be able to compensate for a lot of 'temporary' signal interference as you barrel down the road. GPS receivers know which satellites are expected to be visible from a given location at a given time (thanks to the GPS almanac data broadcast as part of the GPS signal—transparent to the user). Based on that information, your receiver will seek the best combination of 4 satellites to provide you with the best accuracy.



GPS Satellites operate on four overlapping orbits that provide global access to at least 6-8 satellites signals from most locations 24 hours/day.

If the LOS to one or more of these “best four” is blocked, the receiver will look for the next best combination. As the terrain or surrounding structures get steeper, the remaining visible satellites become closer together and accuracy degrades. This is known as the effect of Mask Angle.

When LOS is blocked to the point that it prevents a good position calculation, the receiver will tell the user it is having trouble by displaying a higher Figure of Merit (FOM) value. (check your TM to learn more about FOM). At least now you are aware that GPS accuracy is degraded. The obvious reaction is to pay closer attention to your paper map and use terrain spotting to stay on track until you clear the obstructions and your GPS receiver gets better LOS as indicated by a lower FOM.

It is not just terrain that causes LOS problems. It could be equipment piled atop the vehicle in effect masking the GPS antenna. Your GPS receiver will seek satellites that are low on the horizon for stability and accuracy. Anything that masks the antenna from being able to receive low angle signals can interfere with the GPS receiver.

Finally, you could also be the problem! When using a GPS receiver in the handheld mode, holding it too closely to your body will have the same masking effect on the signal. Give your antenna a fair chance to get a good GPS position calculation!

DAGR Accessories—Interoperable with PLGR

In the 1990s, Total Package Fielding for the AN/PSN-11 PLGR included common accessories, issued one-per-receiver: The installation mount, remote antenna, remote antenna cable, external power cable and personnel case.

Other PLGR accessories were issued on low density distributions such as one for every 10 PLGRs or they were issued on a mission-need basis.

Fast forward to 2005.

Today, Total Package Fielding for the AN/PSN-13A DAGR also provides similar common accessories on a one-per-receiver basis. But this time around the DAGR program was also tasked to provide “backwards compatibility” with PLGR whenever possible. Also referred to as “interoperability”, this means the DAGR should when possible, have the same functionality as the PLGR.

Interoperability has been effectively applied with regard to the DAGR accessories listed below.

The DAGR accessories shown at right can be used by DAGR and PLGR interchangeably (from the top):

DAGR-to-PC Cable 5995-01-521-3198

DAGR-to-HAVEQUICK cable 5995-01-521-2680

DAGR-to-DAGR cable 5995-01-521-2713

Note the corresponding cables originally issued with PLGR can also be used by DAGR. They are not pictured here but include the following:

PLGR-to-PC cable 6150-01-375-8664

PLGR-to-PLGR cable 6150-01375-8663

PLGR-to HAVEQUICK Cable 6150-01-375-8665

Interoperability Beyond Accessories?

Since DAGR is much smaller than PLGR, there is a physical form difference. However, the performance features are similar since both receivers comply with Interface Control Document (ICD-GPS-153) which defines how a receiver ‘communicates’ with other devices. So while the DAGR and PLGR are physically different, they are interoperable in terms of how they work with connected devices.



DAGR Accessories— Not Interoperable with PLGR

In contrast to the items on the facing page, these are some DAGR Basic Issue Items (BII) that cannot be used by PLGR due to physical form or performance design differences (e.g. the smaller size of DAGR and the L1/L2 antenna used by DAGR versus the L1 only version for PLGR).

DAGR BII, Clockwise from the top: (not to scale)

DAGR Installation Mount

5897-01-521-3063

Antenna Remote RA-1

5985-01-502-6692

Cable, DAGR to Remote Antenna Cable
RA-1 (5 meter)

5995-01-504-1762

Cable DAGR/DC Power (5 meter)

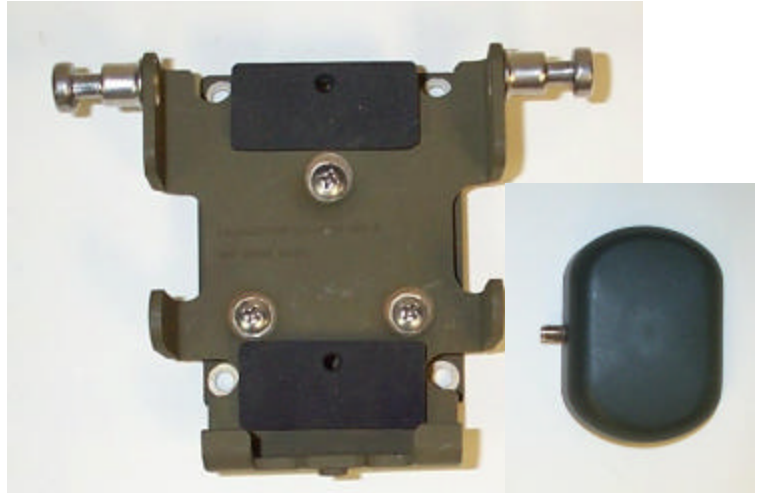
6150-01-521-6757

Personnel Case

5895-01-521-3111

The DAGR program also includes additional accessory items not listed on these 2 pages. For more information about DAGR accessories refer to the DAGR TM 11-5820-1172-13

POC Bill Pohlmann at DSN 992-6131



How to Contact PM GPS

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Who to Call?

For platform integration and new product information, call the Deputy PMO at Los Angeles.

For equipment authorization, maintenance status, fielding, and NET, call the PMO.

For sustainment issues including software, supply, technical publications, accessories and host vehicle installations, call the GFO.

Not Sure? Contact one of our Help Lines:

Willie Jackson in Georgia at DSN 468-3518 or CML (478) 926-3518 willie.jackson@robins.af.mil

Jim Buggy in NJ at DSN 992-4733, CML (732) 532-4733 james.buggy@mail1.monmouth.army.mil.

***Visit the PM GPS WEBSITE:
<http://army-gps.robins.af.mil>***

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